

### **REMARKS**

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claim 4 has been cancelled.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 1, 2, and 5-17 are now pending in this application.

#### **Information Disclosure Statement**

Applicant notes that Information Disclosure Statements and PTO/SB/08 forms were submitted on May 4, 2009 and May 27, 2009.

However, signed and initialed copies of the PTO/SB/08 forms have not been provided by the Office and the Office has not otherwise addressed these Information Disclosure Statements. Applicant respectfully requests that signed and initialed copies of these PTO/SB/08 forms be provided with the next Office correspondence.

#### **Objection to the Drawings**

The drawings are objected to for including an informality. In particular, the Office argues on page 2 of the Office Action that the feature “the radius of curvature R1 which is greater than a rib height RH” of claim 1 is not shown in the drawings. Applicant respectfully disagrees.

Figure 1 shows an example of a portion of a heat exchanger that includes an arcuate piece 6 having in a middle portion a radius of curvature R1 which is greater than a rib height RH of the corrugated rib, as recited in claim 1.

The Office does not explain how the drawings of Applicant's application, such as Figure 1, do not show the features of claim 1. Although it is Applicant's position that at least Figure 1 shows the features noted by the Office, Applicant requests the Office to explain how the drawings should be amended to depict the noted features of claim 1.

For at least the reasons discussed above, reconsideration and withdrawal of this objection is respectfully requested.

**Rejection under 35 U.S.C. § 112**

Claim 1 is rejected under 35 U.S.C. § 112, second paragraph, as allegedly being incomplete for omitting essential elements. This rejection is respectfully traversed.

In particular, the Office argues on page 3 of the Office Action that the unclaimed essential element is a radius of curvature R1 which is greater than a rib height RH of the corrugated rib. However, claim 1 already recites "wherein the arcuate piece has in the middle portion a radius of curvature R1 which is greater than a rib height RH of the corrugated rib."

In addition, Applicant has not defined or otherwise stated that such features are essential elements or essential subject matter. Essential elements are "defined by applicant(s) in the specification." See MPEP § 2172.01, citing *In re Venezia*, 530 F.2d 956, 189 USPQ 149 (CCPA 1976) and *In re Collier*, 397 F.2d 1003, 158 USPQ 266 (CCPA 1968). Applicant has not defined or otherwise stated that the features noted by the Office are essential features.

Reconsideration and withdrawal of this rejection is respectfully requested.

**Rejections under 35 U.S.C. § 103**

Claims 1, 2, 4-6, and 17 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,560,425 to Sugawara *et al.* (hereafter "Sugawara") in view of JP 2002-90083 to Yamaguchi *et al.* (hereafter "Yamaguchi"). This rejection is respectfully traversed.

Sugawara discloses a heat exchanger H that includes header pipes 1, 2 with flat tubes 5 and fins 7 extending between the header pipes 1, 2. See Sugawara at col. 4, lines 40-60.

Sugawara discloses that the flat tubes 5 are made by shaping a flat sheet material into a U-shaped cross-section and welding flanges 21 of sheet material together, with an inner fin 20 placed within the U-shaped sheet. See Sugawara at col. 4, lines 54-60, and Figure 2.

Sugawara discloses that the inner fin 20 divides a flow path within the flat tube 5 into a plurality of small independent flow paths 12. See Sugawara at col. 5, lines 1-11, and Figure 3.

The Office argues on pages 3-4 of the Office Action that the inner fin 20 forms a corrugated rib having at least two rib surfaces which are arranged essentially parallel to one another and are connected by an arcuate piece joined to a flat tube. However, the edge surfaces E of the inner fin 20, which are the surfaces in contact with the flat tube 5 in Figure 3, are flat and so are the adjacent surfaces of the inner fin 20, as shown in Figures 3 and 4 of Sugawara. Therefore, the edge surfaces E cannot be the middle portions of arcuate pieces, as recited in claim 1, because they are flat, not arcuate. Claims 2, 5, 6, and 17 depend from claim 1.

Further, the portions of the inner fin 20 on each side of the edge surface, one of which is identified by numeral 11 in Figure 3, are not essentially parallel to one another, as recited in claim 1, because these surfaces are angled such that these surface extend away from one another in a direction from the top of the flat tube 5 to the bottom of the flat tube 5, as shown in Figure 3 of Sugawara. Nor are these portions of the inner fin 20 connected by an arcuate piece, as recited in claim 1, because the edge surfaces E of the inner fin 20 are flat, not arcuate.

Alternatively, if the Office is referring to the bends in the inner fin 20, such as the bends between the top and bottom flat surfaces contacting the flat tube 5 and the angled side surfaces, such as the surface identified by numeral 11 in Figure 3 of Sugawara, Applicant notes that these angled corners are not arcuate pieces that connect rib surfaces that are essentially parallel to one another, as recited in claim 1, because the top and bottom flat surfaces, such as the edge surfaces E, and the angled side surfaces are not essentially parallel to one another. Instead, these surfaces form an obtuse angle, as shown in Figure 3 of Sugawara.

In addition, the inner fin 20 does not include an arcuate piece having a lower curvature in a middle portion than in a first outer portion and in a second outer portion, wherein the arcuate piece has in the middle portion a radius of curvature  $R_1$  which is greater than a rib height  $RH$  of the corrugated rib, as recited in claim 1. Nor does the inner fin 20 include an arcuate piece having in a first outer portion a radius of curvature  $R_2$  which is lower than half a rib height  $RH$  of a corrugated rib, as recited in claim 1.

The Office argues on page 4 of the Office Action that it would have been obvious to modify the device of Sugawara by the teachings of Yamaguchi to provide the heat exchanger of claim 1. However, Yamaguchi does not cure the deficiencies of Sugawara because Yamaguchi also does not disclose or suggest a corrugated rib having at least two rib surfaces which are arranged essentially parallel to one another and are connected by an arcuate piece joined to a flat tube, wherein the arcuate piece has in a first outer portion a radius of curvature  $R_2$  which is lower than half a rib height  $RH$  of the corrugated rib, as recited in claim 1.

The Office argues on page 4 of the Office Action that Yamaguchi discloses a corrugated rib having an arcuate piece with a middle portion having a lower curvature than a first outer portion. However, Yamaguchi is silent in regard to whether such an arcuate piece has in a first outer portion a radius of curvature  $R_2$  which is lower than half a rib height  $RH$  of the corrugated rib, as recited in claim 1. As a result, Yamaguchi fails to cure the deficiencies of Sugawara.

The Office further argues on page 4 of the Office Action that the proposed modification of the device of Sugawara by the teachings of Yamaguchi would “improve the efficiency of heat exchange.” The Office provides no basis in the art, understanding of one of ordinary skill in the art, or any technical reasoning to support this rationale. As a result, the Office has not set forth a *prima facie* case of obviousness because the Office has not provided a proper rationale to support the Office’s conclusion of obviousness.

For at least the reasons discussed above, the combination of Sugawara and Yamaguchi does not render claims 1, 2, 5, 6, and 17 to be unpatentable because the combination of Sugawara and Yamaguchi does not disclose or suggest all of the features of claim 1.

Reconsideration and withdrawal of this rejection is respectfully requested.

Claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Sugawara and Yamaguchi as applied to claim 1, and further in view of U.S. Patent No. 6,308,527 to Kuroyanagi *et al.* (hereafter “Kuroyanagi”). This rejection is respectfully traversed. Kuroyanagi fails to remedy the deficiencies of Sugawara and Yamaguchi discussed above in regard to independent claim 1, from which claim 8 depends. Reconsideration and withdrawal of this rejection is respectfully requested.

Claims 1, 2, 4-6, and 17 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 2,731,243 to Flurschutz (hereafter “Flurschutz”) in view of Yamaguchi. This rejection is respectfully traversed.

Flurschutz discloses a heat exchange apparatus with a pair of plates 10, 12 and sinuously bent wires that form pin-like fins 17 between the plates 10, 12. See Flurschutz at col. 1, lines 15-20; col. 1, line 71, to col. 2, line 12. Flurschutz discloses that the sinuously bent wires form U-shaped loops, as shown in Figures 3, 5, and 9 of Flurschutz. See Flurschutz at col. 2, lines 8-12.

Flurschutz discloses that plates 10, 12 form a passageway 16 in which the sinuously bent wires are located and that passageways 18, 19 are further located between the plates 10, 12 and walls of adjacent air passages. See Flurschutz at col. 1, line 71, to col. 2, line 5. The apparatus of Flurschutz includes channel members 20 positioned between plates 10, 12 within the passageway 16 and channel members 22 mounted on the outer surfaces of plates 10, 12. See Flurschutz at col. 2, lines 12-24, and Figure 2.

However, Flurschutz does not disclose a heat exchanger comprising, among other things, a soldered heat exchanger network and a corrugated rib having at least two rib surfaces which are arranged essentially parallel to one another and are connected by an arcuate piece joined to a flat tube, wherein the arcuate piece has a lower curvature in a middle portion than in a first outer portion and in a second outer portion, wherein the arcuate piece has in the middle portion a radius of curvature  $R1$  which is greater than a rib height  $RH$  of the corrugated rib, as recited in claim 1. In fact, the wires shown in Figures 3, 5, and 9 of

Flurschutz have constant, uniform curvatures throughout any arcuate portions joined to the plates 10, 12. Any middle portion of an arcuate region of a wire that is joined to the plates 10, 12 of Flurschutz has the same curvature as any outer region flanking the middle portion of that wire, as shown in Figures 3, 5, and 9 of Flurschutz. Nor does any middle portion of an arcuate region where the wires of Flurschutz are joined to the plates 10, 12 have a lower curvature than first and second outer regions of the arcuate region, as recited in claim 1. Furthermore, Flurschutz does not disclose or suggest a corrugated rib having at least two rib surfaces which are arranged essentially parallel to one another and are connected by an arcuate piece joined to a flat tube, wherein the arcuate piece has in a first outer portion a radius of curvature  $R_2$  which is lower than half a rib height  $RH$  of the corrugated rib, as recited in claim 1. Flurschutz is silent in regard to this feature.

As discussed above, Yamaguchi also does not disclose or suggest a corrugated rib having at least two rib surfaces which are arranged essentially parallel to one another and are connected by an arcuate piece joined to a flat tube, wherein the arcuate piece has in a first outer portion a radius of curvature  $R_2$  which is lower than half a rib height  $RH$  of the corrugated rib, as recited in claim 1. As a result, Yamaguchi does not cure the deficiencies of Flurschutz and the combination of Flurschutz and Yamaguchi does not disclose or suggest all of the features of claim 1.

The Office further argues on page 6 of the Office Action that the proposed modification of the device of Flurschutz by the teachings of Yamaguchi would “improve the heat exchange efficiency.” The Office provides no basis in the art, understanding of one of ordinary skill in the art, or any technical reasoning to support this rationale. As a result, the Office has not set forth a *prima facie* case of obviousness because the Office has not provided a proper rationale to support the Office’s conclusion of obviousness.

For at least the reasons discussed above, the combination of Flurschutz and Yamaguchi does not render claims 1, 5, 6, and 17 to be unpatentable because the combination of Flurschutz and Yamaguchi does not disclose or suggest all of the features of claim 1. Applicant respectfully requests reconsideration and withdrawal of this rejection.

Claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Flurschutz and Yamaguchi as applied to claim 1, and further in view of Kuroyanagi. This rejection is respectfully traversed. Kuroyanagi fails to remedy the deficiencies of Flurschutz and Yamaguchi discussed above in regard to independent claim 1, from which claim 8 depends. Reconsideration and withdrawal of this rejection is respectfully requested.

Claims 9 and 11-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Flurschutz and Yamaguchi as applied to claim 1, and further in view of U.S. Patent No. 7,231,965 to Shimoya *et al.* (hereafter "Shimoya"). This rejection is respectfully traversed. Shimoya fails to remedy the deficiencies of Flurschutz and Yamaguchi discussed above in regard to independent claim 1, from which claims 9 and 11-16 depend. Reconsideration and withdrawal of this rejection is respectfully requested.

Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Flurschutz and Yamaguchi in view of U.S. Patent No. 6,805,193 to Hu *et al.* (hereafter "Hu"). This rejection is respectfully traversed. Hu fails to remedy the deficiencies of Flurschutz and Yamaguchi discussed above in regard to independent claim 1, from which claim 7 depends. Reconsideration and withdrawal of this rejection is respectfully requested.

Claim 10 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Flurschutz, Yamaguchi, and Kuroyanagi in view of Shimoya. This rejection is respectfully traversed. Shimoya fails to remedy the deficiencies of Flurschutz, Yamaguchi, and Kuroyanagi discussed above in regard to independent claim 1, from which claim 10 depends. Reconsideration and withdrawal of this rejection is respectfully requested.

Claim 12 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Flurschutz and Yamaguchi in view of U.S. Patent No. 5,361,829 to Kreutzer *et al.* (hereafter "Kreutzer"). This rejection is respectfully traversed. Kreutzer fails to remedy the deficiencies of Flurschutz and Yamaguchi discussed above in regard to independent claim 1, from which claim 12 depends. Reconsideration and withdrawal of this rejection is respectfully requested.

**Conclusion**

Applicant submits that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing or a credit card payment form being unsigned, providing incorrect information resulting in a rejected credit card transaction, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date

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By

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